Technical Paper 305

DEPARTMENT OF THE INTERIOR
ALBERT B. FALL, Secretary

U.S. BUREAU OF MINES
H. FOSTER BAIN, Director

SPECIFICATIONS FOR PETROLEUM PRODUCTS

ADOPTED BY THE

U.S. INTERDEPARTMENTAL PETROLEUM SPECIFICATIONS COMMITTEE

EFFECTIVE JANUARY 23, 1922
AMENDED MARCH 1, 1922

These specifications have been officially adopted by the
Federal Specifications Board for the use of the various
departments and independent establishments
of the Government

WASHINGTON
GOVERNMENT PRINTING OFFICE
1922

U
SG
8311
.S22

The Bureau of Mines, in carrying out one of the provisions of its organic act—to disseminate information concerning investigations made—prints a limited free edition of each of its publications.

When this edition is exhausted, copies may be obtained at cost price only through the Superintendent of Documents, Government Printing Office, Washington, D. C.

The Superintendent of Documents *is not an official of the Bureau of Mines.* His is an entirely separate office and he should be addressed:

SUPERINTENDENT OF DOCUMENTS,
Government Printing Office,
Washington, D. C.

The general law under which publications are distributed prohibits the giving of more than one copy of a publication to one person. The price of this publication is 5 cents.

First edition, March, 1922.

CONTENTS.

Page.
Prefatory statement 1
Specifications for gasoline 2
  Aviation gasoline, fighting grade 2
    General statement 2
    Properties and tests 2
  Aviation gasoline, domestic grade 3
    General statement 3
    Properties and tests 3
  Aviation gasoline, benzol blended 4
  Motor gasoline 4
    General statement 4
    Properties and tests 4
Specifications for naphthas 5
  Mineral spirits 5
    General statement 5
    Properties and tests 5
Specifications for burning oils 5
  Water-white kerosene 5
    General statement 5
    Properties and tests 5
  Special note covering kerosene for United States Navy 6
  Prime white kerosene 6
    General statement 6
    Properties and tests 6
  Long-time burning oil 7
    General statement 7
    Properties and tests 7
  Oil for Bureau of Lighthouses 7
  300-degree mineral seal oil 7
    General statement 7
    Properties and tests 7
  Signal oil 8
    General statement 8
    Properties and tests 8
Specifications for fuel oils 9
  Special fuel oil for Diesel engines in submarines 9
    General statement 9
    Properties and tests 9
  Fuel oil (Navy standard) 9
    General statement 9
    Properties and tests 10
  Bunker fuel-oil "A" 10
    General statement 10
    Properties and tests 10
  Bunker fuel-oil "B" 11
    General statement 11
    Properties and tests 11
  Bunker fuel-oil "C" 11
    General statement 11
    Properties and tests 11
Specifications for lubricants 12
  Class A 12
    General statement 12
    Properties and tests 12
  Class B 13
    General statement 13
    Properties and tests 13
  Class C 14
    General statement 14
    Properties and tests 15

Specifications for lubricants—Continued.

Page.

- Class D 16
  - General statement 16
  - Properties and tests 16
- Aircraft machine-gun oil 17
  - General statement 17
  - Properties and tests 18
- Buffer oil for recoil and recuperator cylinders of all British types of howitzers and gun carriages 18
  - General statement 18
  - Properties and tests 18
- Car and locomotive engine oil 19
  - General statement 19
  - Properties and tests 19
- Compounded steam-cylinder oil for noncondensing engines 19
  - General statement 19
  - Properties and tests 19
- Crank-pin grease, driving-journal compound, rod-cup grease 20
  - General statement 20
  - Properties and tests 20
- Cup grease 20
  - General statement 20
  - Properties and tests 21
- Diesel-engine lubricating oil 21
  - General statement 21
  - Properties and tests 22
- Floor oil 22
  - General statement 22
  - Properties and tests 22
- Gear, chain, and wire-rope lubricant 23
  - General statement 23
  - Properties and tests 23
- Gun and ice-making oil 23
  - General statement 23
  - Properties and tests 23
- Liberty aero and motor-cycle oil 24
  - General statement 24
  - Properties and tests 24
- Marine-engine oil 25
  - General statement 25
  - Properties and tests 25
- Mineral steam-cylinder oil for noncondensing engines 26
  - General statement 26
  - Properties and tests 26
- Paraffin wax 26
  - General statement 26
  - Properties and tests 27
- Recoil oil 27
  - General statement 27
  - Properties and tests 27
- Recuperator oil and grease 28
  - General statement 28
  - Properties and tests 28
- Transformer oil 29
  - General statement 29
  - Properties and tests 29
- Transmission oil 29
  - General statement 29
  - Properties and tests 30
- Rust-preventing compound 30
  - General statement 30
  - Properties and tests 30

Publications on specifications or petroleum products 35

Index 36

SPECIFICATIONS FOR PETROLEUM PRODUCTS.

Adopted by the Interdepartmental Petroleum Specifications Committee.

PREFATORY STATEMENT.

These specifications have been officially adopted by the Federal Specifications Board for the uses of the various departments and independent establishments of the Government. They supersede the specifications published in Bulletins 1 to 5, inclusive, of the Committee on Standardization of Petroleum Specifications.

The Interdepartmental Petroleum Specifications Committee was formed under authority of Circular 42 of the Bureau of the Budget, dated October 10, 1921, and Executive Order 3578, dated November 8, 1921. It replaced the Interdepartmental Committee on Standardization of Petroleum Specifications, which had superseded the war-time Committee on Standardization of Petroleum Specifications. The work of the several committees has been continuous, and the present set of specifications is the result of several years' experience in preparing specifications and drawing up testing methods for petroleum products.

The present set of specifications was prepared by the Technical Committee on Standardization of Petroleum Specifications and adopted by the Interdepartmental Committee on Standardization of Petroleum Specifications, which were the immediate predecessors of the present committee. On October 10, 1921, when they ceased to function, the personnel of the two committees was as follows:

Department or establishment.	Interdepartmental committee.	Technical committee.
Interior	Dr. H. Foster Bain, chairman	Mr. N. A. C. Smith, chairman.
Agriculture	Mr. B. A. Anderton	Mr. B. A. Anderton.
Shipping Board	Mr. M. W. Bowen	Mr. G. M. Talbot.
Post Office	Mr. E. B. Cranford	Mr. E. B. Cranford.
Panama Canal	Mr. W. A. E. Doying	Mr. W. A. E. Doying.
War	Capt. Wm. H. Lee	Capt. Wm. H. Lee.
Navy	Commander H. A. Stuart	Commander H. A. Stuart.
Treasury	Mr. J. H. Vawter	Mr. J. H. Vawter.
Commerce	Dr. C. W. Waidner	Dr. H. C. Dickinson.

These committees felt that they should maintain close cooperation with the various industries interested in the production and use of petroleum products. Accordingly the following advisory board was constituted, consisting of representatives of several engineering societies:

Society.	Representative.
American Society for Testing Materials	Dr. T. G. Delbridge, Chairman.
Independent Oil Mens Association	Mr. E. E. Grant.
Society of Automotive Engineers	Mr. G. A. Green.
Western Petroleum Refiners Association	Mr. H. G. James.
National Petroleum Association	Mr. O. P. Keeney.
American Petroleum Institute	Dr. Van H. Manning.
American Society of Mechanical Engineers	Mr. H. A. S. Howarth.

The present committee in adopting these specifications gratefully acknowledges its indebtedness to the previous committees and to the advisory board. The Interdepartmental Petroleum Specifications Committee is now constituted as follows:

Department.	Committee members.
Interior	Mr. N. A. C. Smith, chairman.
Agriculture	Mr. B. A. Anderton.
Shipping Board	Mr. G. M. Talbot.
Post Office	Mr. E. B. Cranford.
Panama Canal	Mr. W. A. E. Doying.
War	Capt. Wm. H. Lee.
Navy	Commander H. A. Stuart.
Treasury	Mr. J. H. Vawter.
Commerce	Mr. W. S. James.

SPECIFICATIONS FOR GASOLINE.

AVIATION GASOLINE, FIGHTING GRADE.

GENERAL STATEMENT.

1. This specification covers the grade of gasoline used by the United States Government and its agencies, as a fuel for fighting planes where the highest efficiency is required.

2. The gasoline shall be free from undissolved water and suspended matter.

PROPERTIES AND TESTS.

3. *Color.*—Method 10.1. The color shall not be darker than No. 25 Saybolt.

4. *Doctor test.*—Method 520.3. The doctor test shall be negative.

5. *Corrosion test.*—Method 530.1. One hundred c. c. of the gasoline shall cause no gray or black corrosion and no weighable amount of deposit when evaporated in a polished copper dish.

6. *Unsaturated hydrocarbons.*—Method 550.1. Not more than 1 per cent of the gasoline shall be soluble in concentrated sulphuric acid.

7. *Distillation range.*—Method 100.1. The temperature limits for the distillation are as follows:

Original from PRINCETON UNIVERSITY

When 5 per cent of the sample has been recovered in the graduated receiver, the thermometer shall not read more than 65° C. (149° F.) or less than 50° C. (122° F.).

When 50 per cent has been recovered in the receiver, the thermometer shall not read more than 95° C. (203° F.).

When 90 per cent has been recovered in the receiver, the thermometer shall not read more than 125° C. (257° F.).

When 96 per cent has been recovered in the receiver, the thermometer shall not read more than 150° C. (302° F.).

The end point shall not be higher than 165° C. (329° F.).

At least 96 per cent shall be recovered as distillate in the receiver from the distillation.

The distillation loss shall not exceed 2 per cent when the residue in the flask is cooled and added to the distillate in the receiver.

8. *Acidity.*—Method 510.2. The residue remaining in the flask after the distillation is completed shall not show an acid reaction.

9. The United States War Department requires the fighting grade to be colored red after inspection and acceptance.

10. All tests shall be made according to the methods for testing petroleum products adopted by the Interdepartmental Petroleum Specifications Committee. (See Technical Paper 298, Bureau of Mines.)

AVIATION GASOLINE, DOMESTIC GRADE.

GENERAL STATEMENT.

1. This specification covers the grade of gasoline used by the United States Government and its agencies for aviation fuel where the fighting grade is not required.

2. The gasoline shall be free from undissolved water and suspended matter.

PROPERTIES AND TESTS.

3. *Color.*—Method 10.1. The color shall not be darker than No. 25 Saybolt.

4. *Doctor test.*—Method 520.3. The doctor test shall be negative.

5. *Corrosion test.*—Method 530.1. One hundred c. c. of the gasoline shall cause no gray or black corrosion and no weighable amount of deposit when evaporated in a polished copper dish.

6. *Unsaturated hydrocarbons.*—Method 550.1. Not more than 2 per cent of the gasoline shall be soluble in concentrated sulphuric acid.

7. *Distillation range.*—Method 100.1. The temperature limits are as follows:

When 5 per cent of the sample has been recovered in the graduated receiver, the thermometer shall not read more than 75° C. (167° F.), or less than 50° C. (122° F.).

When 50 per cent has been recovered in the receiver, the thermometer shall not read more than 105° C. (221° F.).

When 90 per cent has been recovered in the receiver, the thermometer shall not read more than 155° C. (311° F.).

When 96 per cent has been recovered in the receiver, the thermometer shall not read more than 175° C. (347° F.).

The end point shall not be higher than 190° C. (374° F.).

At least 96 per cent shall be recovered as distillate in the receiver from the distillation.

The distillation loss shall not exceed 2 per cent when the residue in the flask is cooled and added to the distillate in the receiver.

8. *Acidity.*—Method 510.2. The residue remaining in the flask after the distillation is completed shall not show an acid reaction.

9. All tests shall be made according to the methods for testing petroleum products adopted by the Interdepartmental Petroleum Specifications Committee. (See Technical Paper 298, Bureau of Mines.)

AVIATION GASOLINE, BENZOL BLENDED.

This specification has been withdrawn, as further work on it is contemplated.

MOTOR GASOLINE.

GENERAL STATEMENT.

1. This specification covers the grade of gasoline used by the United States Government and its agencies as a fuel for automobile, motor boat, and similar engines.

PROPERTIES AND TESTS.

2. *Color.*—Method 10.1. The color shall not be darker than No. 16 Saybolt.

3. *Corrosion test.*—Method 530.2. A clean copper strip shall not be discolored when submerged in the gasoline for 3 hours at 122° F.

4. *Distillation range.*—Method 100.1. When the first drop has been recovered in the graduated receiver, the thermometer shall not read more than 60° C. (140° F.).

When 20 per cent has been recovered in the receiver, the thermometer shall not read more than 105° C. (221° F.).

When 50 per cent has been recovered in the receiver, the thermometer shall not read more than 140° C. (284° F.).

When 90 per cent has been recovered in the receiver, the thermometer shall not read more than 190° C. (374° F.).

The end point shall not be higher than 225° C. (437° F.).

At least 95 per cent shall be recovered as distillate in the receiver from the distillation.

5. All tests shall be made according to the methods for testing petroleum products adopted by the Interdepartmental Petroleum Specifications Committee. (See Technical Paper 298, Bureau of Mines.)

SPECIFICATIONS FOR NAPHTHAS.

MINERAL SPIRITS.

GENERAL STATEMENT.

1. This specification covers the grade of mineral spirits used by the United States Government and its agencies for thinning paints and varnishes and as a substitute for turpentine.

2. This material shall be practically colorless and free from undissolved water and suspended matter.

PROPERTIES AND TESTS.

3. *Spot test.*—Method 120.1. It shall evaporate completely from filter paper in 30 minutes.

4. *Flash point.*—Method 110.1. The flash point shall not be lower than 30° C. (86° F.) ("Tag" closed tester).

5. *Doctor test.*—Method 520.3. The doctor test shall be negative.

6. *Distillation range.*—Method 100.2. Not over 5 per cent shall distill below 130° C. (266° F.). Not less than 97 per cent shall distill below 230° C. (446° F.).

7. *Acidity.*—Method 510.2. The residue remaining in the flask after the distillation is completed shall not show an acid reaction.

8. All tests shall be made in accordance with the methods for testing petroleum products adopted by the Interdepartmental Petroleum Specifications Committee. (See Technical Paper 298, Bureau of Mines.)

SPECIFICATIONS FOR BURNING OILS.

WATER-WHITE KEROSENE.

GENERAL STATEMENT.

1. This specification covers the grade of kerosene used by the United States Government and its agencies, as an illuminating oil.

2. The oil shall be free from water, glue, and suspended matter.

PROPERTIES AND TESTS.

3. *Color.*—Method 10.1. The color shall not be darker than No. 21 Saybolt.

4. *Flash point.*—Method 110.1. The flash point shall not be lower than 115° F. ("Tag" closed tester).

5. *Sulphur.*—Method 520.1. The sulphur shall not be more than 0.06 per cent.

6. *Flock.*—Method 130.1. The flock test shall be negative.

7. *Distillation.*—Method 100.2. The end point shall not be higher than 600° F.

8. *Cloud test.*—Method 20.1. The oil shall not show a cloud at 0° F.

9. *Doctor test.*—Method 520.3. The doctor test shall be negative.

10. *Burning test.*—Method 210.1. The oil shall burn freely and steadily for 18 hours.

11. All tests shall be made according to the methods for testing petroleum products adopted by the Interdepartmental Petroleum Specifications Committee. (See Technical Paper 298, Bureau of Mines.)

SPECIAL NOTE COVERING KEROSENE FOR UNITED STATES NAVY.

When specifically provided for a representative sample of the oil delivered will be tested photometrically after burning for one hour in a lamp fitted with a No. 1 sun hinge burner. Five hours later another photometric test will be made to determine any change in intensity of the light; the maximum allowable loss shall be 5 per cent. The flame shall show at least 6 candlepower when compared photometrically with an incandescent lamp which has been standardized by the Bureau of Standards.

Otherwise specifications enumerated above apply for United States Navy kerosene.

PRIME WHITE KEROSENE.

GENERAL STATEMENT.

1. This specification covers the grade of kerosene used by the United States Government and its agencies as an illuminating oil which may also be used as a fuel and for cleaning purposes.

2. The oil shall be free from water, glue, and suspended matter.

PROPERTIES AND TESTS.

3. *Color.*—Method 10.1. The color shall not be darker than No. 16 Saybolt.

4. *Flash point.*—Method 110.1. The flash point shall not be lower than 115° F. ("Tag" closed tester).

5. *Sulphur.*—Method 520.1. The sulphur shall not be more than 0.09 per cent.

6. *Flock.*—Method 130.1. The flock test shall be negative.

7. *Distillation.*—Method 100.2. The end point shall not be higher than 625° F.

8. *Cloud test.*—Method 20.1. The oil shall not show a cloud at 5° F.

9. *Burning test.*—Method 210.2. The oil shall burn freely and steadily for eight hours.

10. All tests shall be made according to the methods for testing petroleum products adopted by the Interdepartmental Petroleum Specifications Committee. (See Technical Paper 298, Bureau of Mines.)

LONG-TIME BURNING OIL.

GENERAL STATEMENT.

1. This specification covers the grade of burning oil used by the United States Government and its agencies where a long-time burning oil is required.

2. The oil must be free from water, glue, and suspended matter.

PROPERTIES AND TESTS.

3. *Color.*—Method 10.1. The color shall not be darker than No. 21 Saybolt.

4. *Flash point.*—Method 110.1. The flash point shall not be lower than 115° F. ("Tag" closed tester).

5. *Flock.*—Method 130.1. The flock test shall be negative.

6. *Cloud test.*—Method 20.1. The oil shall not show a cloud at 0° F.

7. *Burning test.*—Method 210.3. The oil must burn freely and steadily for 120 hours or until the oil is consumed.

8. All tests shall be made according to the methods for testing petroleum products adopted by the Interdepartmental Petroleum Specifications Committee. (See Technical Paper 298. Bureau of Mines.)

OIL FOR BUREAU OF LIGHTHOUSES.

The specifications for oil for use by the Bureau of Lighthouses are in process of revision.

300-DEGREE MINERAL SEAL OIL.

GENERAL STATEMENT.

1. This specification covers the grade of oil used by the United States Government and its agencies for lamps in passenger coaches and for illuminating railroad equipment, and where a high-flash illuminant is required.

2. The oil must be free from water, glue, and suspended matter.

PROPERTIES AND TESTS.

3. *Color.*— Method 10.1. The color shall not be darker than No. 16 Saybolt.

4. *Flash point.*—Method 110.3. The flash point shall not be lower than 250° F. (Cleveland open cup).

5. *Fire point.*—Method 110.3. The fire point shall not be lower than 300° F. (Cleveland open cup).

6. *Flock.*—Method 130.2. The flock test shall be negative.

7. *Cloud test.*—Method 20.1. The oil shall not show a cloud at 32° F.

8. *Reaction.*—Method 510.1. The oil shall be neutral.

9. *Burning test.*—Method 210.4. The lamp shall give a symmetrical flame, free from smoke, when burned continuously without readjustment until all of the oil is consumed.

10. All tests shall be made according to the methods for testing petroleum products adopted by the Interdepartmental Petroleum Specifications Committee. (See Technical Paper 298, Bureau of Mines.)

SIGNAL OIL.

GENERAL STATEMENT.

1. This specification covers the grade of oil used by the United States Government and its agencies for railroad signal lamps.

2. The oil shall be free from water, glue, and suspended matter.

3. The oil shall be compounded from 300-degree mineral seal oil, as adopted by the Interdepartmental Petroleum Specifications Committee, with pure prime winter-strained lard oil or sperm oil, or with a mixture of pure prime winter-strained lard oil and sperm oil.

Grade A shall contain not less than 30 per cent of fatty oil by volume.

Grade B shall contain not less than 22 per cent of fatty oil by volume.

Grade A shall always be furnished unless grade B is specifically ordered.

PROPERTIES AND TESTS.

4. *Flash point.*—Method 110.3. The flash point shall not be lower than 250° F. (Cleveland open cup).

5. *Fire point.*—Method 110.3. The fire point shall not be lower than 300° F. (Cleveland open cup).

6. *Cloud test.*—Method 20.1. The oil shall not show a cloud at 32° F.

7. *Free fatty acid.*—Method 510.3. Grade A shall not contain over 0.60 per cent of free fatty acid calculated as oleic acid. Grade B shall not contain over 0.45 per cent of free fatty acid calculated as oleic acid.

8. *Burning test.*—Method 210.5. The oil shall burn 24 hours without trimming or adjustment of the wick.

9. All tests shall be made according to the methods for testing petroleum products adopted by the Interdepartmental Petroleum Specifications Committee. (See Technical Paper 298, Bureau of Mines.)

SPECIFICATIONS FOR FUEL OILS.

SPECIAL FUEL OIL FOR DIESEL ENGINES IN SUBMARINES.

GENERAL STATEMENT.

1. This specification covers the grade of oil used by the United States Government and its agencies as a fuel for Diesel engines in submarines.

2. Fuel oil shall be a hydrocarbon oil, free from grit, acid, and fibrous or other foreign matters likely to clog or injure the burners or valves. If required, it shall be strained by being drawn through filters of wire gauze of 16 meshes to the inch. The clearance through the strainer shall be at least twice the area of the suction pipe, and the strainers shall be in duplicate.

PROPERTIES AND TESTS.

3. *Flash point.*—Method 110.2. The flash point shall not be lower that 150° F. (Pensky-Martens closed tester).

4. *Water and sediment.*—Method 300.3. Water and sediment combined shall not amount to more than 0.1 per cent.

5. *Carbon residue.*—Method 500.1. The carbon residue shall not exceed 0.5 per cent.

6. *Precipitation number.*—Method 310.1. The precipitation number shall not be greater than 0.5.

7. All tests shall be made according to the methods for testing petroleum products adopted by the Interdepartmental Petroleum Specifications Committee. (See Technical Paper 298, Bureau of Mines.)

FUEL OIL (NAVY STANDARD).

GENERAL STATEMENT.

1. This specification covers the grade of oil used by the United States Government and its agencies where a high-grade fuel oil is required. This oil may be used in Diesel engines.

2. Fuel oil shall be a hydrocarbon oil, free from grit, acid, and fibrous or other foreign matters likely to clog or injure the burners or valves. If required, it shall be strained by being drawn through filters of wire gauze of 16 meshes to the inch. The clearance through the strainer shall be at least twice the area of the suction pipe, and the strainers shall be in duplicate.

PROPERTIES AND TESTS.

3. *Flash point.*—Method 110.2. The flash point shall not be lower than 150° F. (Pensky-Martens closed tester). In case of oils having viscosity greater than 30 seconds at 150° F. (Saybolt Furol viscosimeter) (8° Engler), the flash point shall not be below the temperature at which the oil has a viscosity of 30 seconds.

4. *Viscosity.*—Method 30.3. The viscosity shall not be greater than 100 seconds at 77° F. (Saybolt Furol viscosimeter.)

5. *Sulphur.*—Method 520.2. Sulphur shall not be over 1.5 per cent.

6. *Water and sediment.*—Method 300.3. Water and sediment combined shall not amount to over 1 per cent.

7. All tests shall be made according to the methods for testing petroleum products adopted by the Interdepartmental Petroleum Specifications Committee. (See Technical Paper 298, Bureau of Mines.)

BUNKER FUEL-OIL "A."

GENERAL STATEMENT.

1. This specification covers the grade of fuel oil used by the United States Government and its agencies where a low-viscosity oil is required. This oil may be used in Diesel engines.

2. Fuel oil shall be a hydrocarbon oil, free from grit, acid, and fibrous or other foreign matters likely to clog or injure the burners or valves. If required, it shall be strained by being drawn through filters of wire gauze of 16 meshes to the inch. The clearance through the strainer shall be at least twice the area of the suction pipe, and the strainers shall be in duplicate.

PROPERTIES AND TESTS.

3. *Flash point.*—Method 110.2. The flash point shall not be lower than 150° F. (Pensky-Martens closed tester). In case of oils having viscosity greater than 30 seconds at 150° F. (Saybolt Furol viscosimeter) (8° Engler), the flash point shall not be below the temperature at which the oil has a viscosity of 30 seconds.

4. *Viscosity.*—Method 30.3. The viscosity shall not be greater than 100 seconds at 77° F. (Saybolt Furol viscosimeter).

5. *Water and sediment.*—Method 300.3. Water and sediment combined shall not amount to over 1.0 per cent.

6. All tests shall be made according to the methods for testing petroleum products adopted by the Interdepartmental Petroleum Specifications Committee. (See Technical Paper 298, Bureau of Mines.)

BUNKER FUEL-OIL "B."

GENERAL STATEMENT.

1. This specification covers the grade of fuel oil used by the United States Government and its agencies where a more viscous oil than bunker oil "A" can be used. This oil may be used in Diesel engines of a type adapted to an oil of medium viscosity.

2. Fuel oil shall be a hydrocarbon oil, free from grit, acid, and fibrous or other foreign matters likely to clog or injure the burners or valves. If required, it shall be strained by being drawn through filters of wire gauze of 16 meshes to the inch. The clearance through the strainer shall be at least twice the area of the suction type, and the strainers shall be in duplicate.

PROPERTIES AND TESTS.

3. *Flash point.*—Method 110.2. The flash point shall be not lower than 150° F. (Pensky-Martens closed tester).

4. *Viscosity.*—Method 30.2. The viscosity shall not be greater than 100 seconds at 122° F. (Saybolt Furol viscosimeter).

5. *Water and sediment.*—Method 300.3. Water and sediment combined shall not amount to over 1.0 per cent.

6. All tests shall be made according to the methods for testing petroleum products adopted by the Interdepartmental Petroleum Specifications Committee. (See Technical Paper 298, Bureau of Mines.)

BUNKER FUEL-OIL "C."

GENERAL STATEMENT.

1. This specification covers the grade of fuel oil used by the United States Government and its agencies where a high-viscosity oil is satisfactory. This oil may be used in Diesel engines of a type adapted to an oil of high viscosity.

2. Fuel oil shall be a hydrocarbon oil, free from grit, acid, and fibrous or other foreign matters likely to clog or injure the burners or valves. If required, it shall be strained by being drawn through filters of wire gauze of 16 meshes to the inch. The clearance through the strainer shall be at least twice the area of the suction pipe, and the strainers shall be in duplicate.

PROPERTIES AND TESTS.

3. *Flash point.*—Method 110.2. The flash point shall be not lower than 150° F. (Pensky-Martens closed tester).

4. *Viscosity.*—Method 30.2. The viscosity shall not be greater than 300 seconds at 122° F. (Saybolt Furol viscosimeter).

5. *Water.*—Method 300.1. The water content shall not be more than 1.0 per cent.

NOTE.—Oil may be accepted containing not more than 2.0 per cent of water. In this case a deduction in price for all water over 1.0 per cent shall be made.

6. *Sediment.*—Method 300.2. The sediment content shall not be more than 0.25 per cent.

7. All tests shall be made according to the methods for testing petroleum products adopted by the Interdepartmental Petroleum Specifications Committee. (See Technical Paper 298, Bureau of Mines.)

SPECIFICATIONS FOR LUBRICANTS.

CLASS A.

GENERAL STATEMENT.

1. This specification covers the grades of petroleum oil used by the United States Government and its agencies for the general lubrication of engines and machinery where a highly refined oil is not required. This oil is not to be used for steam-cylinder lubrication.

2. Only refined petroleum oils without the admixture of fatty oils, resins, soap, or other compounds not derived from crude petroleum will be considered.

3. These oils shall be supplied in five grades, known as extra light, light, medium, heavy, and extra heavy.

PROPERTIES AND TESTS.

4. *Flash and fire points.*—Method 110.3. The flash and fire points of the five grades shall not be lower than the following:

Grade.	Flash point.	Fire point.
	° *F.*	° *F.*
Extra light	315	355
Light	325	365
Medium	335	380
Heavy	345	390
Extra heavy	355	400

5. *Viscosity.*—Method 30.1. The viscosity of the five grades of oil at 100° F. shall be within the following limits:

	Seconds.
Extra light	135–165
Light	180–220
Medium	270–330
Heavy	360–440
Extra heavy	450–550

6. *Color.*—The color of the extra heavy grade, when mixed with an equal volume of water-white kerosene, shall not be darker than No. 6 National Petroleum Association standard, or its equivalent. The color of the other grades, when mixed with equal volume of water-white kerosene, shall not be darker than No. 5 National Petroleum Association standard, or its equivalent.

7. *Pour point.*—Method 20.1. The pour point shall not be above the following temperatures:

	° F.
Extra light	35
Light	35
Medium	40
Heavy	45
Extra heavy	50

8. *Reaction.*—Method 510.1. The oil shall not show an acid reaction.

9. *Corrosion.*—Method 530.3. A clean copper strip shall not be discolored when submerged in the oil for 3 hours at 212° F.

10. All tests shall be made according to the methods for testing petroleum products adopted by the Interdepartmental Petroleum Specifications Committee. (See Technical Paper 298, Bureau of Mines.)

CLASS B.

GENERAL STATEMENT.

1. This specification covers the grades of petroleum oil used by the United States Government and its agencies for the lubrication of turbines, dynamos, and high-speed steam engines, using circulating and forced-feed systems.

2. Only refined petroleum oils without the admixture of fatty oils, resins, soaps, or other compounds not derived from crude petroleum will be considered.

3. These oils shall be supplied in five grades, known as extra light, light, medium, heavy, and extra heavy.

PROPERTIES AND TESTS.

4. *Flash and fire points.*—Method 110.3. The flash and fire points of the five grades shall not be lower than the following:

Grade.	Flash point.	Fire point.
	° *F.*	° *F.*
Extra light	315	355
Light	325	365
Medium	335	380
Heavy	345	390
Extra heavy	355	400

5. *Viscosity.*—Method 30.1. The viscosity of the five grades at 100° F. shall be within the following limits:

	Seconds.
Extra light	135–165
Light	180–220
Medium	270–330
Heavy	360–440
Extra Heavy	450–550

6. *Color.*—The color of the extra heavy grade when mixed with an equal volume of water-white kerosene shall not be darker than No. 6 National Petroleum Association standard or its equivalent. The color of the other grades when mixed with an equal volume of water-white kerosene shall not be darker than No. 5 National Petroleum Association standard or its equivalent.

7. *Pour point.*—Method 20.1. The pour point shall not be above the following temperatures:

	°F.
Extra light	35
Light	35
Medium	40
Heavy	45
Extra heavy	50

8. *Corrosion.*—Method 530.3. A clean copper strip shall not be discolored when submerged in the oil for 3 hours at 212° F.

9. *Emulsion test.*—Grades extra light, light, and medium.—Method 320.1. Grades heavy and extra heavy.—Method 320.2. The oil shall separate (see note) in 30 minutes from an emulsion with normal caustic soda solution, and the upper layer at the end of thirty minutes shall not contain more than 10.0 per cent of water.—Method 300.4.

NOTE.—This means that there shall be only a slight cuff (no continuous layer of emulsion) between the water and the oil.

10. *Demulsibility.*—Grades extra light, light, and medium.—Method 320.3. Grades heavy and extra heavy.—Method 320.4. The demulsibility shall not be less than 300, and the upper layer at the end of thirty minutes shall not contain more than 5.0 per cent of water.—Method 300.4.

11. All tests shall be made according to the methods for testing petroleum products adopted by the Interdepartmental Petroleum Specifications Committee. (See Technical Paper 298, Bureau of Mines.)

CLASS C.

GENERAL STATEMENT.

1. This specification covers the grades of petroleum oil used by the United States Government and its agencies only when service

conditions necessitate an oil suitable for lubricating both turbine and internal-combustion engines.

2. Only refined petroleum oils without the admixture of fatty oils, resins, soaps, or other compounds not derived from crude petroleum, will be considered.

3. These oils shall be supplied in five grades, known as extra light, light, medium, heavy, and extra heavy.

PROPERTIES AND TESTS.

4. *Flash and fire points.*—Method 110.3. The flash and fire points of the five grades shall not be lower than the following:

Grade.	Flash point.	Fire point.
	° *F.*	° *F.*
Extra light	315	355
Light	325	365
Medium	335	380
Heavy	345	390
Extra heavy	355	400

Oil for use in air compressors where the air leaving any stage or cylinder has a temperature above 212° F. shall have a flash point not lower than 400° F.

5. *Viscosity.*—Method 30.1. The viscosity of the five grades at 100° F. shall be within the following limits:

	Seconds.
Extra light	135–165
Light	180–220
Medium	270–330
Heavy	360–440
Extra heavy	440–550

6. *Color.*—The color of the extra heavy grade when mixed with an equal volume of water-white kerosene shall not be darker than No. 6 National Petroleum Association standard or its equivalent. The color of the other grades when mixed with an equal volume of water-white kerosene shall not be darker than No. 5 National Petroleum Association standard, or its equivalent.

7. *Pour point.*—Method 20.1. The pour point shall not be above the following temperatures:

	° F.
Extra light	35
Light	35
Medium	40
Heavy	45
Extra heavy	50

8. *Acidity.*—Method 510.3. Not more than 0.10 mg. of potassium hydroxide shall be required to neutralize 1 gram of the oil.

9. *Corrosion.*—Method 530.3. A clean copper strip shall not be discolored when submerged in the oil for 3 hours at 212° F.

10. *Emulsion test.*—Grades extra light, light, and medium—Method 320.1. Grades heavy and extra heavy—Method 320.2. The oil shall separate (see note) in 30 minutes from an emulsion with: (1) Distilled water; (2) 1 per cent salt solution; (3) normal caustic solution.

NOTE.—This means that there shall be only a slight cuff (no continuous layer of emulsion) between the water and the oil.

11. *Demulsibility.*—Grades extra light, light, and medium—Method 320.3. Grades heavy and extra heavy—Method 320.4. The demulsibility shall not be less than 300.

12. *Carbon residue.*—Method 500.1. The carbon residue shall not exceed the following:

	Per cent.
Extra light	0.10
Light	.20
Medium	.30
Heavy	.40
Extra heavy	.60

13. Further tests on oils of class C may be required at the option of the department of the Government using the oils.

14. All tests shall be made according to the methods for testing petroleum products adopted by the Interdepartmental Petroleum Specifications Committee. (See Technical Paper 298, Bureau of Mines.)

CLASS D.

GENERAL STATEMENT.

1. This specification covers the grades of petroleum oil used by the United States Government and its agencies for lubrication of internal-combustion engines, except aircraft, air-cooled, and Diesel engines.

2. These oils shall be supplied in five grades, known as extra light, light, medium, heavy, and extra heavy.

PROPERTIES AND TESTS.

3. *Flash and fire points.*—Method 110.3. The flash and fire points of the five grades shall not be lower than the following·

Grade.	Flash point.	Fire point.
	° F.	° F.
Extra light	315	355
Light	325	365
Medium	335	380
Heavy	345	390
Extra heavy	355	400

Digitized by Google Original from PRINCETON UNIVERSITY

4. *Viscosity.*—Method 30.1. The viscosity of the five grades at 100° F. shall be within the following limits:

	Seconds.
Extra light	135–165
Light	180–220
Medium	270–330
Heavy	360–440
Extra heavy	450–550

5. *Color.*—The color of the extra heavy grade, when mixed with an equal volume of water-white kerosene, shall not be darker than No. 6 National Petroleum Association standard, or its equivalent. The color of the other grades, when mixed with an equal volume of water-white kerosene, shall not be darker than No. 5 National Petroleum Association standard, or its equivalent.

6. *Pour point.*—Method 20.1. The pour point shall not be above the following temperatures:

	° F.
Extra light	35
Light	35
Medium	40
Heavy	45
Extra heavy	50

7. *Acidity.*—Method 510.3. Not more than 0.30 mg. of potassium hydroxide shall be required to neutralize 1 gram of the oil.

8. *Corrosion.*—Method 530.3. A clean copper strip shall not be discolored when submerged in the oil for 3 hours at 212° F.

9. *Carbon residue.*—Method 500.1. The carbon residue shall not exceed the following:

	Per cent.
Extra light	0.10
Light	.20
Medium	.30
Heavy	.40
Extra heavy	.60

10. If especially required by the Department purchasing the oils, the demulsibility (grades extra light, light, and medium—method 320.3, grades heavy and extra heavy—method 320.4) shall not be less than 300, and the upper layer at the end of thirty minutes shall not contain more than 5.0 per cent of water.—Method 300.4.

11. All tests shall be made according to the methods for testing petroleum products adopted by the Interdepartmental Petroleum Specifications Committee. (See Technical Paper 298, Bureau of Mines.)

AIRCRAFT MACHINE-GUN OIL.

GENERAL STATEMENT.

1. This specification covers the grade of petroleum oil used by the United States Government and its agencies for the lubrication

of machine guns on aircraft, for the c. c. interrupter gears, and for gun oil for cleaning and oiling machine guns and small arms.

2. The oil shall be a highly refined, filtered, straight-run petroleum oil, suitable in every way for the uses specified in paragraph 1. It shall be a pure petroleum product, without the addition of vegetable or animal oils or fats of any kind. It shall not contain any material which might gum or corrode metals under any conditions.

PROPERTIES AND TESTS.

3. *Flash point.*—Method 110.3. The flash point shall not be less than 200° F.

4. *Viscosity.*—Method 30.1. The viscosity at 100° F. shall be within the following limits: 80 to 115 seconds.

5. *Pour point.*—Method 20.1. The pour point shall be 45° or more below 0° F.

6. *Acidity.*—Method 510.3. Not more than 0.10 mg. of potassium hydroxide shall be required to neutralize 1 gram of oil.

7. *Carbon residue.*—Method 500.1. The carbon residue shall not be more than 0.03 per cent.

8. All tests shall be made according to the methods for testing petroleum products adopted by the Interdepartmental Petroleum Specifications Committee. (See Technical Paper 298, Bureau of Mines.)

BUFFER OIL FOR RECOIL AND RECUPERATOR CYLINDERS OF ALL BRITISH TYPES OF HOWITZERS AND GUN CARRIAGES.

GENERAL STATEMENT.

1. This specification covers the grade of petroleum oil used by the United States Government and its agencies for filling the recoil and recuperator cylinders of all British-type howitzers and gun carriages.

2. The oil shall be a pure refined petroleum oil.

PROPERTIES AND TESTS.

3. *Flash point.*—Method 110.3. The flash point shall not be lower than 265° F.

4. *Viscosity.*—Method 30.1. The viscosity at 100° F. shall be within the following limits: 65 to 75 seconds.

5. *Pour point.*—Method 20.1. The pour point shall not be above 0° F.

6. *Acidity.*—Method 510.3. Not more than 0.10 mg. of potassium hydroxide shall be required to neutralize 1 gram of the oil.

7. All tests shall be made according to the methods for testing petroleum products adopted by the Interdepartmental Petroleum Specifications Committee. (See Technical Paper 298, Bureau of Mines.)

CAR AND LOCOMOTIVE ENGINE OIL.

GENERAL STATEMENT.

1. This specification covers the grade of oil used by the United States Government and its agencies as a lubricant on journals of all cars, passenger coaches, steam and electric locomotives.

PROPERTIES AND TESTS.

2. *Flash point.*—Method 110.3. The flash point shall not be lower than 300° F.

3. *Viscosity.*—Method 30.1. The viscosity at 210° F. shall be within the following limits: 65 to 75 seconds.

4. *Pour point.*—Method 20.1. The pour point shall not be above 45° F.

5. *Precipitation number.*—Method 310.1. The precipitation number shall not be greater than 0.5.

6. All tests shall be made according to the methods for testing petroleum products adopted by the Interdepartmental Petroleum Specifications Committee. (See Technical Paper 298, Bureau of Mines.)

COMPOUNDED STEAM-CYLINDER OIL, FOR NONCONDENSING ENGINES.

GENERAL STATEMENT.

1. This specification covers the grade of petroleum oil used by the United States Government and its agencies for the lubrication of steam cylinders of noncondensing engines and pumps where a compounded oil is required.

PROPERTIES AND TESTS.

2. The oil shall be a well-refined petroleum oil, compounded with not less than 5 nor more than 7 per cent of acidless tallow oil or lard oil.

3. *Flash point.*—Method 110.3. The flash point shall not be lower than 475° F.

4. *Viscosity.*—Method 30.1. The viscosity at 210° F. shall be within the following limits: 120 to 150 seconds.

5. *Pour point.*—Method 20.1. The pour point shall not be above 60° F.

6. *Precipitation number.*—Method 310.1. The precipitation number shall not be greater than 0.5.

7. *Acidity.*—Method 510.3. The oil shall not contain more than 0.40 per cent of acid calculated as oleic acid (equivalent to 0.80 mg. KOH per gram of oil.)

8. All tests shall be made according to the methods for testing petroleum products adopted by the Interdepartmental Petroleum Specifications Committee. (See Technical Paper 298, Bureau of Mines.)

CRANK-PIN GREASE, DRIVING-JOURNAL COMPOUND, ROD-CUP GREASE.

GENERAL STATEMENT.

1. This specification covers the grade of grease used by the United States Government and its agencies for the lubrication of driving journals on locomotives (provided with grease cellars) and for the lubrication of cranks and rods on locomotives (provided with grease cups).

2. The grease must be a well-manufactured product, suitable in every way for the purposes listed in paragraph 1. It shall be composed of a soda soap (made from tallow), combined with a well-refined cylinder-stock petroleum oil.

PROPERTIES AND TESTS.

3. It shall be smooth and uniform, and must not crumble under pressure.

4. *Color.*—Driving-journal compound shall be green or greenish in color. Rod-cup grease and crank-pin grease shall be slightly yellowish in color.

5. *Soap content.*—The soap content shall not be less than the following: Driving-journal compound, 45 per cent; rod-cup grease, 40 per cent.

6. *Free alkali.*—Neither grade shall contain less than 0.50 per cent nor more than 2.5 per cent of free alkali, calculated as NaOH.

7. The total water, glycerin, and impurities present shall not exceed one-third the total dry soap content.

8. All tests shall be made according to the methods for testing petroleum products adopted by the Interdepartmental Petroleum Specifications Committee. (See Technical Paper 298, Bureau of Mines.)

CUP GREASE.

GENERAL STATEMENT.

1. This specification covers the grades of cup grease used by the United States Government and its agencies for the lubrication of such parts of motor equipment and other machinery as are lubricated by means of compression cups; No. 0 and No. 1 to be used in spindle cups or transmissions.

Original from PRINCETON UNIVERSITY

2. The grease shall be a well-manufactured product, composed of a calcium soap made from high-grade animal or vegetable oils or fatty acids, and a highly refined mineral oil.

3. The mineral oil used in reducing the soaps shall be a straight well-refined mineral oil with a viscosity at 100° F. of not less than 100 seconds.

PROPERTIES AND TESTS.

4. *Soap content.*—The content of soap for the several grades shall be as follows:

(*a*) No. 0 cup grease shall contain approximately 13 per cent of calcium soap.

(*b*) No. 1 cup grease shall contain approximately 14 per cent of calcium soap.

(*c*) No. 3 cup grease shall contain approximately 18 per cent of calcium soap.

(*d*) No. 5 cup grease shall contain approximately 24 per cent of calcium soap.

5. *Consistence.*—These greases shall be similar in consistence to the approved trade standards for No. 0, No. 1, No. 3, and No. 5 grease.

6. *Moisture.*—The grease shall be a boiled grease, containing not more than 3 per cent of water when finished.

7. *Corrosion.*—A clean copper plate shall not be discolored when submerged in the grease for 24 hours at room temperature.

8. *Ash.*—The ash content shall be as follows:

No. 0 grease: The ash shall not be greater than 1.7 per cent.
No. 1 grease: The ash shall not be greater than 1.8 per cent.
No. 3 grease: The ash shall not be greater than 2.3 per cent.
No. 5 grease: The ash shall not be greater than 3.5 per cent.

9. *Fillers.*—The grease shall contain no fillers such as resin, resinous oils, soapstone, wax, talc, powdered mica or graphite, sulphur, clay, asbestos, or any other filler.

10. All tests shall be made according to the methods for testing petroleum products adopted by the Interdepartmental Petroleum Specifications Committee. (See Technical Paper 298, Bureau of Mines.)

DIESEL-ENGINE LUBRICATING OIL.

GENERAL STATEMENT.

1. This specification covers the grade of oil used by the United States Government and its agencies for the lubrication of Diesel engines.

2. The oil shall be made from pure, highly refined petroleum products and must be suitable in every way for the entire lubrication

of Diesel engines. The oil shall not contain moisture, sulphonates, soap, resin, or tarry constituents which would indicate adulteration or lack of proper refining.

PROPERTIES AND TESTS.

3. *Flash point.*—Method 110.3. The flash point shall not be lower than 360° F.

4. *Viscosity.*—Method 30.1. The viscosity at 210° F. shall be within the following limits: 55–65 seconds.

5. *Pour point.*—Method 20.1. The pour point shall not be above 45° F.

6. *Acidity.*—Method 510.3. Not more than 0.30 mg. of potassium hydroxide shall be required to neutralize 1 gram of the oil.

7. *Emulsion tests.*—Method 320.2. The oil shall separate completely in one hour from an emulsion with distilled water at a temperature of 180° F.

8. *Carbon residue.*—Method 500.1. The carbon residue shall not be greater than 0.80 per cent.

9. All tests shall be made according to the methods for testing petroleum products adopted by the Interdepartmental Petroleum Specifications Committee. (See Technical Paper 298, Bureau of Mines.)

FLOOR OIL.

GENERAL STATEMENT.

1. This specification covers the grade of oil used by the United States Government and its agencies for polishing and preserving wooden floors.

2. The oil shall be a well-refined straight petroleum oil.

PROPERTIES AND TESTS.

3. *Flash point.*—Method 110.3. The flash point shall not be lower than 300° F.

4. *Viscosity.*—Method 30.1. The viscosity at 100° F. shall be within the following limits: 60 to 100 seconds.

5. *Color.*—The oil shall be pale or red in color. Black oil will not be accepted.

6. *Pour point.*—Method 20.1. The pour point shall not be above 35° F.

7. All tests shall be made according to the methods for testing petroleum products adopted by the Interdepartmental Petroleum Specifications Committee. (See Technical Paper 298, Bureau of Mines.)

GEAR, CHAIN, AND WIRE-ROPE LUBRICANT.

GENERAL STATEMENT.

1. This specification covers the grade of petroleum oil used by the United States Government and its agencies for the lubrication and protection of chains, wire ropes, and gears of cranes, dredges, steam shovels and all other heavy equipment, for the lubrication and protection of the gears and ropes of balloon hoists, and for swabbing the wires and cables of aircraft.

2. The oil shall be a petroleum product only, free from vegetable or animal oils or products derived from them. It shall be entirely free from fillers, such as talc, resin, and all materials of every nature not related to the original product.

PROPERTIES AND TESTS.

3. *Viscosity.*—Method 30.1. The viscosity at 210° F. shall be within the following limits: 900 to 1,100 seconds.

4. *Protection.*—Method 400.1. When applied to a plate of polished steel, the lubricant shall protect the steel for a period of 30 days when immersed in a 10 per cent salt solution.

5. All tests shall be made according to the methods for testing petroleum products adopted by the Interdepartmental Petroleum Specifications Committee. (See Technical Paper 298, Bureau of Mines.)

GUN AND ICE-MACHINE OIL.

GENERAL STATEMENT.

1. This specification covers the grades of petroleum oil used by the United States Government and its agencies for cleaning and oiling guns and small arms where aircraft machine-gun oil is not required; also for lubrication of the cylinders of ice machines, for lubrication of pneumatic tools, and for hydraulic systems.

2. The oil shall be a straight-run, highly refined petroleum oil, free from vegetable or animal oils or products derived from them, shall be suitable in every way for the uses listed in paragraph 1, and shall not gum or corrode metals under any conditions.

3. These oils shall be supplied in two grades known as No. 100 and No. 125.

PROPERTIES AND TESTS.

4. *Flash point.*—Method 110.3. The flash point shall not be lower than 290° F.

5. *Viscosity.*—Method 30.1. The viscosity at 100° F. shall be within the following limits: No. 100 oil, 95 to 110 seconds; No. 125 oil, 120 to 135 seconds.

6. *Pour point.*—Method 20.1. The pour point shall not be above 5° F.

7. *Acidity.*—Method 510.3. Not more than 0.10 mg. of potassium hydroxide shall be required to neutralize 1 gram of the oil.

8. *Emulsifying properties.*—Method 320.1. The oil shall separate completely in 30 minutes from an emulsion with normal caustic soda solution, and the upper layer at the end of thirty minutes shall not contain more than 10.0 per cent of water.—Method 300.4.

9. *Demulsibility.*—Method 320.3. The demulsibility shall not be less than 300, and the upper layer at the end of thirty minutes shall not contain more than 5.0 per cent of water.—Method 300.4.

10. All tests shall be made according to the methods for testing petroleum products adopted by the Interdepartmental Petroleum Specifications Committee. (See Technical Paper 298, Bureau of Mines.)

LIBERTY AERO AND MOTORCYCLE OIL.

GENERAL STATEMENT.

1. This specification covers the grades of oil used by the United States Government and its agencies for the lubrication of stationary-cylinder aircraft engines and motorcycles.

2. The oil shall be made from pure, highly refined petroleum products and must be suitable in every way for the entire lubrication of stationary-cylinder aircraft engines and motorcycle engines operating under all conditions. The oil shall not contain moisture, sulphonates, soap, resin, or tarry constituents which would indicate adulteration or lack of proper refining.

3. These oils shall be supplied in three grades, to be known as grade 1, grade 2, and grade 3.

PROPERTIES AND TESTS.

4. *Flash point.*—Method 110.3. The flash point of the three grades shall not be lower than the following: Grade 1, 400° F.; grade 2, 500° F.; grade 3, 450° F.

5. *Viscosity.*—Method 30.1. The viscosity of the three grades at 210° F. shall be within the following limits: Grade 1 (summer), 90–100 seconds; grade 1 (winter), 75–85 seconds; grade 2, 125–135 seconds; grade 3, 115–125 seconds.

6. *Pour points.*—Method 20.1. The pour points of the three grades shall not be above the following limits: grade 1 (summer), 45° F.; (winter), 15° F.; grade 2, 50° F.; grade 3, 45° F.

7. *Acidity.*—Method 510.3. Not more than 0.10 mg. of potassium hydroxide shall be required to neutralize 1 gram of grade 1 or grade 3 oil.

8. *Emulsion test.*—Method 320.2. The oil shall separate completely in one hour from an emulsion with distilled water at a temperature of 180° F.

9. *Carbon residue.*—Method 500.1. The carbon residue on grade 1 shall not be over 1.5 per cent; on grade 2, not over 2 per cent, on grade 3, not over 2 per cent.

10. *Precipitation number.*—Method 310.1. The precipitation number shall not be greater than 0.5.

11. All tests shall be made according to the methods for testing petroleum products adopted by the Interdepartmental Petroleum Specifications Committee. (See Technical Paper 298, Bureau of Mines.)

MARINE ENGINE OIL.

GENERAL STATEMENT.

1. This specification covers the grades of oil used by the United States Government and its agencies for the lubrication of reciprocating steam engines in marine service where compounded engine oil is required. These oils must not be used in circulating or forced-feed systems.

2. These oils shall be supplied in two grades, to be known as grade 1 and grade 2.

PROPERTIES AND TESTS.

3. Grade 1 oil shall be a compounded oil made from refined petroleum oil and 10 per cent to 20 per cent of blown refined rapeseed or blown refined peanut oil, so compounded that it will not separate or break down in any way either before or while it is in service. Grade 2 oil shall be a compounded oil made from refined petroleum oil and 10 per cent to 20 per cent of blown refined rapeseed oil or an oil of equivalent emulsifying power, so compounded that it will not separate or break down in any way either before or while it is in service.

4. *Viscosity.*—Method 30.1. The viscosity of the two grades at 210° F. shall be within the following limits: 65–75 seconds.

The viscosity of the two grades at 100° F. shall not be greater than 850 seconds.

5. *Pour point.*—Method 20.1. The pour point of grade 1 oil shall not be above 32° F., of grade 2 oil, not above 45° F.

6. *Acidity.*—Method 510.3. The oil shall not contain more than 1.50 per cent of acid calculated as oleic acid (equivalent to 3 mg. KOH per gram of oil).

7. *Corrosion.*—Method 530.3. A clean copper strip shall not be discolored when submerged in the oil for 3 hours at 212° F.

8. *Emulsion test.*—Method 320.1. The oil shall remain completely emulsified for an hour from an emulsion with: (1) Distilled water; (2) 1 per cent salt solution.

9. *Wick feed.*—Method 200.1. The oil shall show a flow at the end of 14 days of at least 30 per cent of its flow at the end of the first 24-hour period.

10. All tests shall be made according to the methods for testing petroleum products adopted by the Interdepartmental Petroleum Specifications Committee. (See Technical Paper 298, Bureau of Mines.)

MINERAL STEAM-CYLINDER OIL FOR NONCONDENSING ENGINES.

GENERAL STATEMENT.

1. This specification covers the grades of petroleum oil used by the United States Government and its agencies for noncondensing steam-engine cylinder lubrication where mineral oil is required.

2. These oils shall be supplied in two grades to be known as grade 1 and grade 2.

PROPERTIES AND TESTS.

3. The oil shall be a well-refined petroleum oil without compounding of any nature.

4. *Flash point.*—Method 110.3. The flash point of grade 1 oil shall not be lower than 475° F.; of grade 2 oil, not lower than 525° F.

5. *Viscosity.*—Method 30.1. The viscosity at 210° F. shall be within the following limits: Grade 1, 135 to 165 seconds; grade 2, 180 to 220 seconds.

6. *Pour point.*—Method 20.1. The pour point shall not be above 60° F.

7. *Precipitation number.*—Method 310.1. The precipitation number shall not be greater than 0.5.

8. *Carbon residue.*—Method 500.1. The carbon residue shall not be greater than 3 per cent.

9. All tests shall be made according to the methods for testing petroleum products adopted by the Interdepartmental Petroleum Specifications Committee. (See Technical Paper 298, Bureau of Mines.)

PARAFFIN WAX.

GENERAL STATEMENT.

1. This specification covers the grades of paraffin wax used by the United States Government and its agencies.

2. This wax shall be a highly refined petroleum product, free from animal or vegetable wax or other adulterants.

3. This wax shall be supplied in three grades, known as 130 to 132, 124 to 127, and 117 to 120.

PROPERTIES AND TESTS.

4. *Color.*—Method 10.1. The color of the melted wax shall not be darker than No. 25 Saybolt.

5. *Melting point.*—Methods 40.1 or 40.2. The melting points shall be as indicated:

Grade.	Melting point.	
	° F.	° C.
130-132	130-132	Approximately 55.
124-127	124-127	Approximately 52.
117-120	117-120	Approximately 48.

6. All tests shall be made according to the methods for testing petroleum products adopted by the Interdepartmental Petroleum Specifications Committee. (See Technical Paper 298, Bureau of Mines.)

RECOIL OIL.

GENERAL STATEMENT.

1. This specification covers the grades of petroleum oil used by the United States Government and its agencies to fill the recoil cylinders of gun carriages.

2. Only refined petroleum oils without the admixture of fatty oils, resins, soap, or other compounds not derived from crude petroleum will be considered.

3. These oils shall be supplied in three grades, known as light, medium, and heavy.

PROPERTIES AND TESTS.

4. *Flash and fire points.*—Method 110.3. The flash and fire points of the three grades shall not be lower than the following:

Grade.	Flash point.	Fire point.
	° F.	° F.
Light	225	250
Medium	315	355
Heavy	345	390

5. *Viscosity.*—Method 30.1. The viscosity of the three grades of oil at 100° F. shall be within the following limits:

	Seconds.
Light	40– 45
Medium	140–160
Heavy	385–430

6. *Color.*—The oil shall be pale or red in color. Black oil will not be accepted.

7. *Pour point.*—Method 20.1. The pour point shall be 5 or more degrees below zero F.

8. *Acidity.*—Method 510.3. Not more than 0.10 mg. of potassium hydroxide shall be required to neutralize 1 gram of the oil.

9. *Corrosion.*—Method 530.3. A clean copper strip shall not be discolored when submerged in the oil for 3 hours at 212° F.

10. All tests shall be made according to the methods for testing petroleum products adopted by the Interdepartmental Petroleum Specifications Committee. (See Technical Paper 298, Bureau of Mines.)

RECUPERATOR OIL AND GREASE.

GENERAL STATEMENT.

1. This specification covers the grade of petroleum oil and grease used by the United States Government and its agencies for the recoil mechanism of 75 and 155 mm. French gun carriages.

2. *Recuperator oil.*—Recoil oil (heavy) shall be used.

3. *Recuperator grease.*—The grease shall be a well-manufactured product composed of a calcium soap made from high-grade animal or vegetable oils or fatty acids and a highly refined mineral oil.

4. The mineral oil used in reducing the soap shall have a viscosity at 100° F. of not less than 180 seconds.

PROPERTIES AND TESTS.

5. *Soap content.*—The grease shall contain approximately 18 per cent of a calcium soap.

6. *Consistence.*—This grease shall be similar in consistence to the approved trade standard for No. 3 grease.

7. *Moisture.*—The grease shall be a boiled grease containing not less than 1 nor more than 3 per cent of water when finished.

8. *Corrosion.*—Method 530.3. A clean copper strip shall not be discolored when submerged in the grease for 3 hours at 212° F.

9. *Ash.*—The ash shall not be greater than 2.3 per cent.

10. *Fillers.*—The grease shall contain no fillers, such as resin, resinous oils, soapstone, wax, talc, powdered mica or graphite, sulphur, clay, asbestos, or any other filler.

11. All tests shall be made according to the methods for testing petroleum products adopted by the Interdepartmental Petroleum Specifications Committee. (See Technical Paper 298, Bureau of Mines.)

TRANSFORMER OIL.

GENERAL STATEMENT.

1. This specification covers the grade of petroleum oil used by the United States Government and its agencies for oil switches, oil circuit breakers, and transformers.

2. The oil shall be made from pure, highly refined, petroleum products, free from animal or vegetable oils or fats of any kind, and shall be suitable in every way for the purposes listed in paragraph 1.

PROPERTIES AND TESTS.

3. *Flash point.*—Method 110.3. The flash point shall not be lower than 290° F.

4. *Viscosity.*—Method 30.1. The viscosity at 100° F. shall be within the following limits: 95 to 110 seconds.

5. *Pour point.*—Method 20.1. The pour point shall not be above 20° F.

6. *Acidity.*—Method 510.3. Not more than 0.10 mg. of potassium hydroxide shall be required to neutralize 1 gram of the oil.

7. *Heat test.*—The oil shall not show a deposit or any change other than a darkening of color when heated to 450° F.

8. *Corrosion test.*—Method 530.3. A clean copper strip shall not be discolored when submerged in the oil for 3 hours at 212° F.

9. *Breakdown test.*—Method 410.1. The breakdown value shall not be less than 23,000 volts.

10. *Unsaturation test.*—Method 550.2. The oil shall not contain more than 4 per cent of hydrocarbons soluble in concentrated sulphuric acid.

11. All tests shall be made according to the methods for testing petroleum products adopted by the Interdepartmental Petroleum Specifications Committee. (See Technical Paper 298, Bureau of Mines.)

TRANSMISSION OIL.

GENERAL STATEMENT.

1. This specification covers the grade of petroleum oil used by the United States Government and its agencies for the lubrication of transmission gears and bearings, differential gears, worm drives, winch drives, and roller and ball bearings used in connection with such parts of the equipment of motor vehicles.

2. The lubricant shall be a refined petroleum product, without the addition of any vegetable or animal oils or products derived from them, and shall be entirely free from fillers.

PROPERTIES AND TESTS.

3. *Flash point.*—Method 110.3. The flash point shall not be lower than 460° F.

4. *Viscosity.*—Method 30.1. The viscosity at 210° F. shall be within the following limits: 135 to 165 seconds.

5. All tests shall be made according to the methods for testing petroleum products adopted by the Interdepartmental Petroleum Specifications Committee. (See Technical Paper 298, Bureau of Mines.)

RUST-PREVENTING COMPOUND.

GENERAL STATEMENT.

1. This specification covers the grades of material used by the United States Government and its agencies for the protection of metals when a nondrying compound is required.

2. The material shall contain no abrasive substances, must not separate when heated to 190° F., and must be readily removable from metal surfaces by the use of waste saturated with kerosene.

3. The material shall be supplied in two consistences: "A," semisolid; and "B," liquid. Consistence "A" must adhere firmly to all metal surfaces and preserve a continuous, complete, and protective film at all temperatures at which such surfaces might be exposed under normal conditions in all climates. Consistence "B" must be a lubricant, must contain no ingredient which would interfere with the lubrication of the metal surfaces treated, and must be sufficiently transparent to leave visible any evidence of corrosion.

PROPERTIES AND TESTS.

4. *Corrosion test.*—Method 530.4. Clean strips of brass, steel, and aluminum shall not be discolored or pitted when submerged in the compound for five days at room temperature.

5. *Melting point.*—The melting point of consistence "A" shall be within the following limits: 120 to 125° F.

6. *Pour point.*—Method 20.1. The pour point of consistence "B" shall not be above 60° F.

7. *Oven salt-spray rain test.*—Method 400.2. Consistence "A" shall protect steel plates from rust for 60 days.

8. All tests shall be made according to the methods for testing petroleum products adopted by the Interdepartmental Petroleum Specifications Committee. (See Technical Paper 298, Bureau of Mines.)

Specifications for petroleum products.

Interdepartmental Petroleum Specifications Committee.—Effective January 23, 1922.

GASOLINE AND NAPHTHA.

Name and grade.	Color, darkest allowed.	Doctor test.	Corrosion test.	Unsaturated hydrocarbons, maximum.	Distillation range.																		Recovery, minimum.	Distillation loss, maximum.	Acidity test.	Special tests and requirements.
					First drop, maximum.		5 per cent minimum.		5 per cent maximum.		20 per cent maximum.		50 per cent maximum.		90 per cent maximum.		96 per cent maximum.		97 per cent maximum.		End point maximum.					
	Saybolt No.			*P. ct.*	°*C.*	°*F.*	°*C.*	°*F.*	°*C.*	°*F.*	°*C.*	°*F.*	°*C.*	°*F.*	°*C.*	°*F.*	°*C.*	°*F.*	°*C.*	°*F.*	°*C.*	°*F.*	*P. ct.*	*P. ct.*		
Aviation gasoline:																										
fighting	25	Required	Required	1.0			50	122	65	149			95	203	125	257	150	302			165	329	96	2	Required	Red dye.
domestic	25	do	do	2.0			50	122	75	167			105	221	155	311	175	347			190	374	96	2	do	
Motor gasoline	16		do		60	140					105	221	140	284	190	374					225	437	95			
Mineral spirits		Required					130	266											230	446					Required	Spot and flash.

BURNING OILS.

Name and grade.	Color, darkest allowed.	Flash point, "Tag."	Sulphur, maximum.	Flock test.	End point, maximum.	Cloud test, maximum.	Doctor test.	Burning test.	Photometric test.	Reaction test.	Flash point, Cleveland, minimum.	Fire point, Cleveland, minimum.	Compounding, minimum.	Fatty acid, maximum.
	Saybolt No.	°*F.*	*P. ct.*		°*F.*	°*F.*		*Hours.*			°*F.*	°*F.*	*P. ct.*	*P. ct.*
Water-white kerosene	21	115	0.06	Required	600	Zero.	Required	18						
Water-white (U. S. Navy)	21	115	.06	do	600	Zero.	do	18	May be required.					
Prime white kerosene	16	115	.09	do	625	5		8						
Long-time burning oil	21	115		do		Zero.		120						
300-degree mineral seal	16			do		32		Special		Required	250	300		
Signal oil, A						32		do			250	300	30	0.60
Signal oil, B						32		do			250	300	22	.45

Original from PRINCETON UNIVERSITY

Specifications for petroleum products—Continued.

FUEL OILS FOR USE IN OIL BURNERS AND IN DIESEL ENGINES.

Name and grade.	Flash point, Pensky-Martens, minimum.	Water, maximum.	Sediment, maximum.	Water and sediment, maximum.	Carbon residue, maximum.	Precipitation, maximum.	Furol viscosity at 77° F., maximum.	Furol viscosity at 122° F., maximum.	Sulphur, maximum.
	° F.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*		*Sec.*	*Sec.*	*Per cent.*
Special fuel for Diesel engines in submarines	150			0.1	0.5	0.5			
Navy standard	150			1.0			100		1.5
Bunker A	150			1.0			100		
Bunker B	150			1.0				100	
Bunker C	150	1.0	0.25					300	

GREASES.

Name and grade.	Viscosity at 100° F. of mineral oil, minimum.	Calcium soap content, approximate.	Moisture, maximum.	Corrosion test.	Ash.	Soda soap content, minimum.	Free alkali, NaOH.	Color.	Water, glycerin, and impurities, maximum of dry soap content.
	Saybolt seconds.	*Per cent.*	*Per cent.*		*Per cent.*	*Per cent.*	*Per cent.*		*Per cent.*
Cup grease No. 0	100	13	3	Required	1.7				
Cup grease No. 1	100	14	3	do	1.8				
Cup grease No. 3	100	18	3	do	2.3				
Cup grease No. 5	100	24	3	do	3.5				
Recuperator grease	180	18	3	do	2.3				
Crank-pin grease						40	0.5 to 2.5	Yellowish	33⅓
Driving-journal compound						45	.5 to 2.5	Greenish	33⅓
Rod-cup grease						40	.5 to 2.5	Yellowish	33⅓

WAXES.

Name and grade.	Color of melted wax.	Melting point.
	Saybolt No.	*° F.*
Paraffin:		
130 to 132	25	130 to 132
124 to 127	25	124 to 127
117 to 120	25	117 to 120

Original from PRINCETON UNIVERSITY

LUBRICATING OILS.

Name and grade.	Flash, minimum.	Fire, minimum.	Viscosity, Saybolt seconds.				Color NPA, darkest color allowed when diluted 50 per cent.	Pour maximum.	Acidity, maximum mg. KOH per gram.	Corrosion test.	Emulsion test.	Demulsibility, minimum.	Carbon residue, maximum.	Precipitation, maximum.	Compounding.	Special tests required.
			100° F.		210° F.											
			Minimum.	Maximum.	Minimum.	Maximum.										
	° F.	° F.	Sec.	Sec.	Sec.	Sec.		° F.					P. ct.	No.	P. ct.	
Class A, extra light	315	355	135	165			No. 5	35		Required						Reaction test.
Class A, light	325	365	180	220			do.	35		do.						
Class A, medium	335	380	270	330			do.	40		do.						
Class A, heavy	345	390	360	440			do.	45		do.						
Class A, extra heavy	355	400	450	550			No. 6	50		do.						
Class B, extra light	315	355	135	165			No. 5	35		do.	Required	300				
Class B, light	325	365	180	220			do.	35		do.	do.	300				
Class B, medium	335	380	270	330			do.	40		do.	do.	300				
Class B, heavy	345	390	360	440			do.	45		do.	do.	300				
Class B, extra heavy	355	400	450	550			No. 6	50		do.	do.	300				
Class C, extra light	315	355	135	165			No. 5	35	0.10	do.	do.	300	0.10			
Class C, light	325	365	180	220			do.	35	.10	do.	do.	300	.20			
Class C, medium	335	380	270	330			do.	40	.10	do.	do.	300	.30			
Class C, heavy	345	390	360	440			do.	45	.10	do.	do.	300	.40			
Class C, extra heavy	355	400	450	550			No. 6	50	.10	do.	do.	300	.60			
Class D, extra light	315	355	135	165			No. 5	35	.30	do.		Optional	.10			
Class D, light	325	365	180	220			do.	35	.30	do.		do.	.20			
Class D, medium	335	380	270	330			do.	40	.30	do.		do.	.30			
Class D, heavy	345	390	360	440			do.	45	.30	do.		do.	.40			
Class D, extra heavy	355	400	450	550			No. 6	50	.30	do.		do.	.60			
Aircraft machine gun	200		80	115				−45	.10				0.03			
Buffer	265		65	75				Zero.	.10							
Car and locomotive engine	300				65	75		45						0.5		
Compounded steam cylinder.	475				120	150		60	.80					.5	5-7	
Diesel engine	360				55	65		45	.30		Special		.80			
Floor	300		60	100			Red	35								
Gear, chain, and wire rope					900	1,100										
Gun and ice machine No. 100.	290		95	110				5	.10		Required	300				Protection test.
Gun and ice machine No. 125.	290		120	135				5	.10		do.	300				
Liberty Aero, No. 1 summer	400				90	100		45	.10		Special		1.5	.5		
Liberty Aero, No. 1 winter	400				75	85		15	.10		do.		1.5	.5		
Liberty Aero, No. 2	500				125	135		50			do.		2.0	.5		

Specifications for petroleum products—Continued.

LUBRICATING OILS—continued.

Name and grade.	Flash, minimum.	Fire, minimum.	Viscosity, Saybolt seconds.				Color, NPA, darkest color allowed when diluted, 50 per cent.	Pour, maximum.	Acidity, maximum mg. KOH per gram.	Corrosion test.	Emulsion test.	Demulsibility, minimum.	Carbon residue, maximum.	Precipitation, maximum.	Compounding.	Special tests required.
			100° F.		210° F.											
			Minimum.	Maximum.	Minimum.	Maximum.										
	° F.	° F.	Sec.	Sec.	Sec.	Sec.		° F.					P. ct.	No.	P. ct.	
Liberty Aero, No. 3	450				115	125		45	0.10		Special		2.0	0 5		
Marine engine No. 1				850	65	75		32	3.00	Required	do.				10-20	Wick-feed test.
Marine engine No. 2				850	65	75		45	3.00	do.	do.				10-20	Do.
Mineralsteam cylinder No. 1	475				135	165		60					3.0	.5		
Mineralsteam cylinder No. 2	525				180	220		60					3.0	.5		
Recoil oil, light	225	250	40	45			Red	−5	.10	Required						
Recoil oil, medium	315	355	140	160			do.	−5	.10	do.						
Recoil oil, heavy	345	390	385	430			do.	−5	.10	do.						
Transformer	290		95	110				20	.10	do.						Heat, breakdown, and unsaturation tests.
Transmission	460				135	165										

Original from PRINCETON UNIVERSITY

PUBLICATIONS ON SPECIFICATIONS FOR PETROLEUM PRODUCTS.

A limited supply of the following publications of the Bureau of Mines has been printed and is available for free distribution until the edition is exhausted. Requests for all publications can not be granted, and to insure equitable distribution applicants are requested to limit their selection to publications that may be of especial interest to them. Requests for publications should be addressed to the Director, Bureau of Mines.

The Bureau of Mines issues a list showing all the publications available for free distribution, as well as those obtainable only from the Superintendent of Documents, Government Printing Office, on payment of the price of printing. Interested persons should apply to the Director, Bureau of Mines, for a copy of the latest list.

PUBLICATIONS AVAILABLE FOR FREE DISTRIBUTION.

BULLETIN 207. The analytical distillation of petroleum and its products, by E. W. Dean, H. H. Hill, N. A. C. Smith, and W. A. Jacobs. 1921. 80 pp., 3 pls., 33 figs.

TECHNICAL PAPER 163. Physical and chemical properties of gasoline sold throughout the United States during the calendar year 1915, by W. F. Rittman, W. A. Jacobs, and E. W. Dean. 1916. 42 pp., 4 figs.

TECHNICAL PAPER 214. Motor gasoline: Properties, laboratory methods of testing, and practical specifications, by E. W. Dean. 1919. 33 pp., 2 figs.

TECHNICAL PAPER 298. Methods for testing petroleum products, adopted by the Interdepartmental Petroleum Specifications Committee. A handbook for inspecting laboratories. 1922. 58 pp.

PUBLICATIONS THAT MAY BE OBTAINED ONLY THROUGH THE SUPERINTENDENT OF DOCUMENTS.

BULLETIN 125. Analytical distillation of petroleum, by W. F. Rittman and E. W. Dean. 1916. 79 pp., 1 pl., 16 figs. 15 cents.

BULLETIN 191. Quality of gasoline marketed in the United States, by H. H. Hill and E. W. Dean. 1921. 275 pp., 22 figs. 30 cents.

TECHNICAL PAPER 74. Physical and chemical properties of the petroleums of California, by I. C. Allen, W. A. Jacobs, A. S. Crossfield, and R. R. Mathews. 1914. 38 pp., 1 fig. 5 cents.

TECHNICAL PAPER 181. Determination of unsaturated hydrocarbons in gasoline by E W. Dean and H. H. Hill. 1917. 25 pp. 5 cents.

INDEX OF EQUIVALENT TRADE TERMS.

The accompanying index gives the commercial or trade name of each of the various petroleum products covered by the specifications, the equivalent specification, and also the number of the page on which the specification appears.

Trade name.	Specification.	Page.
A.		
Air-compressor oil	Class D	16
Aircraft machine-gun oil		18
Airplane gasoline	Aviation gasoline, domestic grade	3
Motor oil	Liberty aero and motorcycle oil	24
Ammonia-machine oil	Gun and ice-machine oil	23
Automobile gasoline	Motor gasoline	4
Oil	Class D	16
Aviation gasoline, domestic grade		3
Fighting grade		2
B.		
Buffer oil		18
Burning oil, long-time		7
C.		
Car oil	Car and locomotive engine oil	19
Carbon oil	Water-white kerosene	5
Chain grease	Gear, chain, and wire-rope lubricant	23
Lubricant	do	23
Coal oil	Water-white kerosene	5
Compound, driving journal	Crank-pin grease, etc	20
Compounded steam-cylinder oil		19
Compounded valve oil	Compounded steam-cylinder oil	19
Crank-pin grease		20
Cup grease		20
Cylinder oil, gas engine	Class D	16
Steam, compounded		19
Mineral		26
D.		
Diesel engine, fuel oil	All grades of fuel oil	9-11
Lubricating oil		21
Driving-journal compound	Crank-pin grease, etc	20
Dynamo oil	Class B	13
E.		
Electric-motor oil	Class B	13
Engine oil, gas	Class D	16
High speed	Class B	13
Locomotive		19
Marine		25
Red	Class A	12
F.		
Fighting gasoline	Aviation gasoline, fighting grade	2
Floor oil		22
Fuel oil:		
Bunker A		10
Bunker B		11
Bunker C		11
For Diesel engines—special		9
Navy standard		9
G.		
Gas-engine cylinder oil	Class D	16
Gas-engine oil	do	14-16
Gasoline:		
Airplane	Aviation gasoline, domestic grade	3
Automobile	Motor gasoline	4

Trade name.	Specification.	Page.
Gasoline—Continued.		
Aviation, domestic grade		3
Fighting grade		2
Fighting	Aviation gasoline, fighting grade	2
High test	Aviation gasoline, domestic grade	3
Motor		4
Motorboat	Motor gasoline	4
Motorcycle	do	4
Navy	do	4
Navy, new	do	4
Gear, chain, and wire-rope lubricant		23
Gear grease	Gear, chain, and wire-rope lubricant	23
Lubricant	do	23, 29
Grease, chain	do	23
Crank pin		20
Cup		20
Gear	Gear, chain, and wire-rope lubricant	23
Recuperator		28
Rod cup	Crank-pin grease, etc	20
Wire rope	Gear, chain, and wire-rope lubricant	23
Gun and ice-machine oil		23
Gun oil	Gun and ice-machine oil	23
Aircraft machine		18
H.		
High-speed engine oil	Class B	13
High-test gasoline	Aviation gasoline, domestic grade	3
I.		
Ice-machine oil	Gun and ice-machine oil	23
Illuminating oil		5–7
K.		
Kerosene oil	Water-white kerosene	5
Navy special	Water-white kerosene (United States Navy)	6
Prime white		6
Water-white		5
L.		
Lamp oil	Water-white kerosene	7, 8
Liberty aero oil		24
Locomotive engine oil		19
Long-time burning oil		7
Lubricant:		
Chain	Gear, chain, and wire-rope lubricant	23
Diesel engine		21
Gear	Gear, chain, and wire-rope lubricant	23
Transmission	Transmission oil	29
Wire rope	Gear, chain, and wire-rope lubricant	23
M.		
Machine-gun oil, aircraft		18
Machine oil	Class A	12
Marine-engine oil		25
Mineral seal oil, 300°		7
Mineral spirits		5
Steam-cylinder oil	Mineral steam-cylinder oil	26
Turpentine	Mineral spirits	5
Valve oil	Mineral steam-cylinder oil	26
Motor gasoline		4
Motor oil, electric	Class B	13
Motortruck oil	Class D	16
Motorboat gasoline	Motor gasoline	4
Oil	Class D	16
Motorcycle gasoline	Motor gasoline	4
Oil	Liberty aero and motorcycle oil	24
N.		
Naphthas		5
Navy gasoline	Motor gasoline	4
New Navy gasoline	do	4
O.		
Oil, air-compressor	Class D	16
Airplane motor	Liberty aero and motorcycle oil	24
Ammonia machine	Gun and ice-machine oil	23
Automobile	Class D	16
Burning, long-time		7

Trade name.	Specification.	Page.
Oil—Continued.		
Car		19
Carbon	Water-white kerosene	5
Coal	do.	5
Cylinder, gas-engine	Class D	16
Steam, compounded		19
Mineral		26
Diesel	Fuel oils	9–11
Dynamo	Class B	13
Engine, high-speed	do.	13
Locomotive		19
Marine		25
Red	Class A	12
Floor		22
For recoil mechanisms	Recoil oil	18
Fuel:		
Bunker A		10
Bunker B		11
Bunker C		11
For Diesel engines	All grades of fuel oil	9–11
Navy standard		9
Gas engine	Class D	16
Gun		23
Gun, aircraft machine		18
Ice machine	Gun and ice-machine oil	23
Illuminating oil		5–7
Kerosene	Water-white kerosene	5
Lamp	do.	5
Liberty aero		24
Locomotive engine		19
Machine	Class A	12
Machine gun, aircraft		18
Marine engine		25
Mineral seal, 300°		7
Motor, electric	Class B	13
Motorboat	Class D	16
Motorcycle	Liberty aero and motorcycle oil	24
Motortruck	Class D	16
Pneumatic tool	Gun and ice-machine oil	23
Polishing	Floor oil	22
Recoil		18, 27
Recuperator		18, 28
Seal, mineral, 300°		7
Signal		8
Steam cylinder, compounded		19
Mineral		26
Switch	Transformer oil	29
300° mineral seal		7
Transformer		29
Transmission	Transmission oil	29
Turbine	Class B	13
Valve, compounded	Compounded steam-cylinder oil	19
Mineral	Mineral steam-cylinder oil	26
Water white	Water-white kerosene	5
P.		
Paraffin wax		26
Polishing oil	Floor oil	22
Pneumatic-tool oil	Gun and ice-machine oil	23
Prime white kerosene		6
Pumps, lubricant for steam	Compounded steam cylinder oil	19
R.		
Recoil oil		18, 27
Recuperator grease		28
Oil		18, 28
Red engine oil	Class A	12
Rod-cup grease	Crank-pin grease, etc	20
Rust-preventing compound		30
S.		
Seal oil, mineral, 300°		7
Signal oil		8
Spirits, mineral		5
Steam-cylinder oil, compounded		19
Mineral		26
Steam engines, high-speed, oil	Class B	13
Submarines, fuel oil	Special fuel oil for Diesel engines	9
Switch oil	Transformer oil	29

Trade name.	Specification.	Page.
T.		
Transformer oil		29
Transmission oil		29
Turbine oil	Class B	13
Turpentine, mineral	Mineral spirits	13, 14
Substitute	do	5
V.		
Valve oil, compounded	Compounded steam-cylinder oil	19
Mineral	Mineral steam-cylinder oil	26
W.		
Water-white kerosene		5
Water-white kerosene (U. S. Navy)		6
Oil	Water-white kerosene oil	5
Wax, paraffin		26
Wire rope grease	Gear, chain, and wire-rope lubricant	23
Lubricant	do	23